

Consensus Revenue Estimating Conference Forecast Errors – State General Fund Direct

Fiscal Year	Initial Forecast	Before Session	After Session	Last Forecast	1% Error Equals
1989	-23.29%	-14.24%	-7.04%	-3.70%	\$43.4 m
1990	-10.34%	-9.09%	+0.99%	-1.35%	\$41.6 m
1991	-13.38%	-11.80%	-2.56%	-0.25%	\$42.3 m
1992	-1.15%	+7.06%	+5.57%	+2.64%	\$39.0 m
1993	-10.55%	-10.83%	-1.46%	-2.35%	\$42.8 m
1994	-1.82%	-1.82%	+0.36%	-0.10%	\$43.3 m
1995	-16.09%	-15.49%	-3.47%	-2.24%	\$47.8 m
1996	-7.73%	-4.60%	-6.32%	-3.61%	\$51.6 m
1997	-19.24%	-17.36%	-7.08%	-1.41%	\$56.6 m
1998	-4.99%	-3.77%	-3.91%	-1.80%	\$57.8 m
1999	-5.84%	+1.72%	+1.76%	+1.76%	\$57.0 m
2000	+0.45%	+2.94%	-1.00%	-1.13%	\$58.5 m
2001	-14.57%	-10.91%	-7.09%	-3.75%	\$65.3 m
2002	-2.47%	-1.91%	-0.20%	+0.10%	\$64.5 m
2003	-7.35%	-7.15%	+1.66%	+0.10%	\$64.0 m
2004	-4.60%	-4.21%	-3.35%	-0.43%	\$67.7 m
2005	-11.39%	-7.68%	-5.68%	-3.08%	\$73.9 m
2008	-14.93%	-14.07%	-7.61%	-1.72%	\$101.7m
2009	-1.24%	3.37%	-0.26%	-0.53%	\$93.9m
2010	14.17%	12.32%	9.57%	1.49%	\$71.8m
2011	3.48%	-0.42%	1.03%	0.23%	\$77.5m
Average	-7.28%	-5.14%	-1.72%	-1.01%	
MAPE	9.00%	7.69%	3.71%	1.61%	
2006	-14.46%	-12.42%	-24.12%	-9.86%	\$83.0 m
2007	-31.54%	-24.68%	-8.21%	-10.57%	\$96.8 m
Average	-8.65%	-6.31%	-2.97%	-1.81%	
MAPE	10.22%	8.63%	4.80%	2.36%	
Under-Forecasts	20 of 23, 95%	18 of 23, 78%	16 of 23, 70%	17 of 23, 74%	

Table Contents

The table above displays forecast errors of the Consensus Revenue Estimating Conference (REC), for the bottom line discretionary means-of-finance of the budgetary process, funds available for direct state general fund appropriation. Since its inception, the REC has considered forecasts for a large number of fiscal years, of which 23 complete years are included in the table aboveⁱ. The forecast error as a percent of actual collections is displayed for each fiscal year for forecasts made at four stages of the budget cycle, and these errors are summarized from inception through FY 2005 (prior to hurricanes Katrina and Rita), and then inclusive of the four complete fiscal years since the storm aftermath years (FYs 2006 and 2007). Forecast errors over these periods are summarized in two ways: (1) the simple average of errors where under-forecasts (negative signs) and over-forecasts (positive signs) are combined within the average, and (2) the mean absolute percent error (MAPE) where the sign of the error is not consideredⁱⁱ. The dollar equivalent of a 1% forecast error is shown for each year, and finally, the preponderance of under-forecasts is summarized for the entire period. The last two pages of this write-up visually depict forecast performance over the REC history.

Forecasts Evaluated

The REC may make numerous forecasts for any particular fiscal year, but forecasts made at four stages of the budget process were chosen for evaluation because they are the most meaningful ones the REC makes from the perspective of its role in the budget process.

- a) The initial forecast establishes the first forecast of a particular fiscal year (once that year becomes one of the two immediate fiscal years that is the typical focus of the budget construction process). This could be as much as eighteen months in advance of the start of a fiscal year, but in recent years has typically been done in the fall preceding the start of the fiscal year. This has also typically been the first forecast used in the construction of the executive budget proposal.
- b) The before-session forecast establishes the latest forecast before enactment of each year's budget. Legislative adjustments to the executive proposal are made on the basis of this forecast, and in recent years this forecast has typically been made during the legislative session, in mid-May after preliminary income tax collections from April are known.
- c) The after-session forecast incorporates session actions that are expected to affect revenue collections. The REC statutory provisions call for this forecast to occur no later than August 15 of each year, and in the early years of the REC a meeting was typically held by that date. In later years the REC has tended to incorporate session actions into overall base revisions made at a meeting typically held in the fall of the year, unless large session actions need to be adopted prior to enactment of an appropriations billⁱⁱⁱ.
- d) The last forecast is the last base revision of a particular fiscal year. The dates of this meeting can range throughout the second half of the fiscal year, but recently have typically been in conjunction with the before-session forecast for the ensuing fiscal year (mid-May). This forecast is typically used to adopt supplemental appropriations near the end of the current fiscal year.

Errors Decline Over The Forecast Cycle

As can be seen in the table on page one and in the chart at the end of this report, annual forecasting errors can vary widely, both on a year-to-year basis and throughout the budget cycle for a particular year. However, for all but two years (FYs 1992 and 2000), errors declined from the initial forecast to the last forecast, although errors do not always decline from one stage to the next in a cycle. The occurrence of smaller errors near the end of a forecast cycle is to be expected as more information about events affecting collections as well as the collections themselves is accumulated during a forecast cycle. The table indicates that, on average, roughly one-half of the error in the before-session forecasts is eliminated in the after-session forecasts^{iv}. Bills changing taxes and dedicating taxes enacted almost every legislative session tend to be the most significant events affecting revenue collections, and forecast error typically becomes significantly smaller once these actions are accounted for. Relatively small reductions in error occur after that, even though additional actual collections performance is being incorporated into the forecasts. This error pattern is depicted visually at the end of this write-up.

Pre-Storms' Errors Fairly Small

Over the multiyear period from inception of the REC through FY 2005, the simple average forecast error was -2.28% after session actions are incorporated and -1.21% as of the last forecasts made for each year. This performance compares well with a typical informal revenue forecasting error standard of 2%^v. However, a simple average of errors understates the true average error because the positive and negative signs of individual years' errors tend to offset somewhat in the averaging. The average absolute error over this period (MAPE) is 3.50% after session actions are incorporated and 1.75% as of the last forecasts. While the MAPE for after-session forecasts is not as low as desired it still represents a reduction of 62% of the error associated with initial forecasts, and a 55% reduction from the before-session forecasts. Regardless of which average error concept is employed, the last forecasts made each year are well within the 2% error goal.

Post-Storms' and Economic Cycle Errors Quite Large

The forecasting process struggled with the rapid and dramatic increase in state revenue collections in the periods after hurricanes Katrina and Rita (occurring in the first quarter of FY 2006), as evidenced by the large errors associated with the forecasts for FYs 2006 and 2007, even at the after-session and last-forecast stages; -24.12% and -9.86%, respectively for FY 2006, and -8.21% and -10.57% for FY 2007. Coming on the heels of the storms was the peak of the economic cycle in FY 2008 and then its trough in FY 2010. In both years, the after-session errors were large, -7.61% in FY 2008 and +9.57% in 2010, although the last-forecast errors for these two years were fairly small (other than the turning points themselves, no surprises occurred in revenue collections at year-end.

The errors for the truly extraordinary storm years of FY 2006 and FY 2007 are excluded from the first average error and MAPE calculation in the table above (although they are included in the second of these calculations that includes all REC years). However, the large errors associated with economic cycles are not excluded. The forecasting process is expected to deal with economic cycles; although, forecasting will rarely deal with these cycles accurately.

Under-Forecast Bias

A pattern that is obvious from the table is the preponderance of under-forecasts made since inception of the REC. For the twenty-three complete years of REC forecasts, 95% (20 of 23) of the initial forecasts and 78% (18 of 23) of the before-session forecasts were under-forecasts. By the time the after-session and last forecast were made each year this under-forecast bias had dropped only modestly to 70% (16 of 23) and 74% (17 of 23), respectively. In the early years of the REC process this tendency to under-forecast was likely due to the recent memories of the oil-bust years of 1982 – 1986. In fact, the REC process was implemented, in large part, as a response to the large deficits and budget disruptions of those years. Persistence of an under-forecast bias in later years of the REC process is probably better understood in terms of the different costs imposed by different forecast errors. An under-forecast does not preclude actual receipt and expenditure of state revenues, and is thus a less costly forecast error. A delay may occur in the ability to utilize a surplus, but actual revenue collections occur regardless of the forecast and are ultimately available for expenditure.^{vi} However, an over-forecast cannot make revenue available that is not collected. Once budgets are established on the basis of the forecast in place, a shortfall in forecasted collections must be addressed, typically by reducing planned expenditures. In addition, the later in the fiscal year a shortfall is acknowledged, the more difficult it is to deal with in general, and especially by expenditure reductions alone. Thus, over-forecasts can be more disruptive to governmental budgeting and service provision, and are thus a more costly forecast error. The forecasters and conference members are aware of these consequences, and tend to make forecasts that are reasonably expected to be attained during the fiscal year (while still striving for a maximum average forecast error of 2% or less). While the strict technical goal of forecasting may be to achieve forecasts that are as accurate as possible each and every year, this is a compelling goal only in the abstract, where the purposes for which the forecasts are being made, annual budgeting of ongoing governmental service provision, are ignored. It is preferable for forecast errors to be as small as possible, but a 0% average error would occur only with comparable over-forecast and under-forecast years. Given that over-forecasts are more costly in terms of disruption of the ultimate purpose of the forecasts (the budgeting and provision of governmental services), it is understandable that under-forecasts tend to dominate the REC performance. This error pattern is depicted visually at the end of this write-up.

Dollar Equivalent of 1% Error Increases Over Time

Finally, the far right column of the table displays the dollar equivalent of a 1% forecast error each year since inception of the REC. This column points out the increase in that dollar equivalent over time. Growing by 79% since inception of the REC, \$43.4 million for FY 1989 and now \$77.5 million for FY 2011^{vii}. This growth in the absolute value of forecast error occurs because the State tax revenue base being forecast grows over time (from \$4.34 billion in 1989 to \$7.75 billion in 2011). Even if forecast error were the same each year and was very small (1% for example), the dollar equivalent of that error will get larger and larger as the tax revenue base grows. Thus, the budgetary consequences of forecast error will get larger and larger, even if forecast errors themselves are fairly small.

ⁱ Since its inception, the REC has met approximately 3 to 4 times per year to consider forecasts for the two immediate budget years that are its primary focus, the current fiscal year and the ensuing fiscal year, as well as the three following fiscal years¹. Only the forecasts for the two immediate fiscal years are considered in the table above. The forecasts for any of the three additional fiscal years that are made for the out-year planning process are not included.

ⁱⁱ The mean absolute percent error (MAPE) averages the absolute value of the percentage errors for all the years of each of the two periods (REC inception through pre-Katrina/Rita FY 2005, and then inclusive of all completed fiscal years). It reflects overall forecast error without regard to whether errors are under-forecasts or over-forecasts. The MAPE is a better measure of forecast error than the simple average because the positive and negative signs of individual errors work to offset each other in the simple average, resulting in a lower measure of error than is truly the case.

ⁱⁱⁱ The Conference's statutory provisions provide for meetings at least quarterly, by October 15, January 1, the third Monday in March, and August 15. In practice, the typical REC meeting schedule has evolved to a meeting in the late fall (November/December), mid-session (May), by September 30 (to adopt the Labor Department's unemployment compensation fund balance), and any other time as necessary. Meetings between the fall and mid-session, as well as even later in the session are becoming more typical, as well.

^{iv} A number of the forecasts that first incorporate session actions also incorporate some actual collections experience (typically one-quarter of collections). Thus, on average, some of this error reduction is attributable to this fact and not strictly to the incorporation of session actions alone. However, apart from the storms of 2005, session actions constitute the most important events influencing revenue forecasts and collections between the before-session forecast and the after-session forecast.

^v There is no formal or official standard for forecasting accuracy. Through many discussions with state revenue forecasters over the years, a 2% error seems to be the typical standard that most apply to their own work. Individual revenue sources can have significantly higher error standards depending on their own characteristics but a 2% error for the bottom-line forecast is typical.

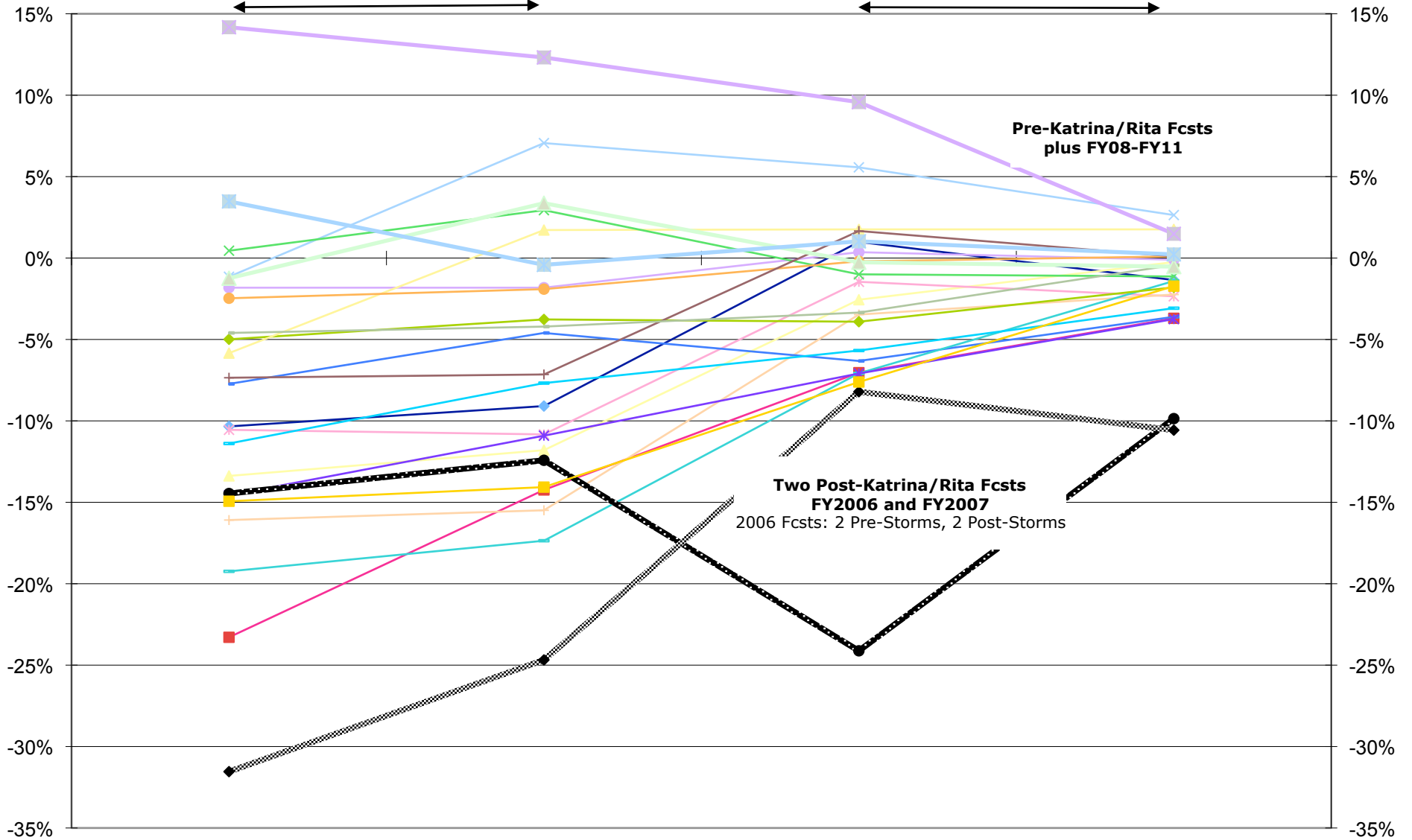
^{vi} Under-forecasts may still be undesirable for a number of reasons. Were forecasts more accurate, these funds could have been allocated to some purpose (recurring or nonrecurring) at an earlier date. In addition, the initial allocation of surplus funds is generally at the initiative of the governor, where later changes to these initial proposed uses by the legislature implies "taking" the promised funds from a use or project that now expects them. Finally, end-of-year surplus balances become designated as nonrecurring and can only be allocated to Constitutionally prescribed uses, generally capital outlay or debt reduction. Flexibility or discretion in their use is significantly limited.

^{vii} The dollar equivalent of 1% of forecast error has been as great as \$101.7 million in FY08 (134% greater than the FY89 REC starting year). This year was the recent history peak of state revenue collections, as the post-storm recovery combined with the national economic boom. The years of FY07 and FY09 also exhibited 1% forecast error equivalents that were greater than 100% of the REC starting year of FY89. In FY07 the 1% error was \$96.8 million or 123% greater, and in FY09 it was \$93.9 million or 116% greater. Post-storm recovery fade-out, economic recession, and substantial state tax cuts have resulted in the current dampened levels of 1% error equivalents.

REC SGF Forecast Errors

Before Fiscal Year Begins and
Before Session Actions Are Incorporated

After Fiscal Year Begins and
After Session Actions Are Incorporated



Pre-Katrina/Rita Fcsts
plus FY08-FY11

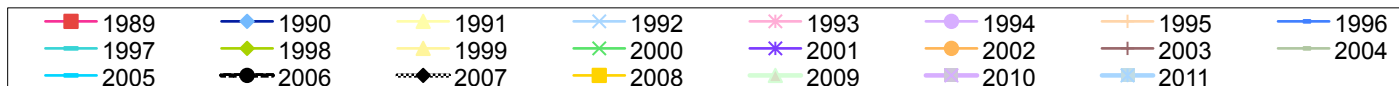
Two Post-Katrina/Rita Fcsts
FY2006 and FY2007
2006 Fcsts: 2 Pre-Storms, 2 Post-Storms

Initial Fcst

Before Session

After Session

Last Fcst



REC SGF Forecasts Relative To Actuals, Over Time

billions

\$12,000
\$10,000
\$8,000
\$6,000
\$4,000
\$2,000
\$0

1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011

SGF-Actual Initial Fcst Before Session After Session Last Fcst

